CAMERA BASED SENSING IN HANDHELD, MOBILE, GAMING, OR OTHER DEVICES

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of application Ser. No. 10/893,534, filed Jul. 19, 2004; now U.S. Pat. No. 7,401,783 which is a continuation of application Ser. No. 09/612,225, filed Jul. 7, 2000, now U.S. Pat. No. 6,766,036; which claims the benefit of U.S. Provisional Application No. 60/142,777 filed Jul. 8, 1999.

Cross references to related applications by the inventor having similar subject matter.

1. Touch TV and other Man Machine Interfaces (Ser. No. 09/435,854 which was a continuation of application Ser. No. 07/946,908, now U.S. Pat. No. 5,982,352,);
2. More Useful Man Machine Interfaces and application Ser. No. 09/433,297;
3. Useful Man Machine interfaces and application Ser. No. 09/138,339, now Pub. Appln. 2002-0036617;
4. Vision Target based assembly, U.S. Ser. No. 08/469,907, now U.S. Pat. No. 6,301,783;
5. Picture Taking method and apparatus U.S. provisional application 60/133,671, now filed as regular application Ser. No. 09/586,552;
6. Methods and Apparatus for Man Machine Interfaces and Related Activity, U.S. Provisional Application 60/133,673, filed as regular application Ser. No. 09/568,554, now U.S. Pat. No. 6,545,670;
7. Tactile Touch Screens for Automobile Dashboards, Interiors and Other Applications, provisional application Ser. No. 60/183,807 filed as reg. application Ser. No. 09/789,538; and
8. Apparel Manufacture and Distance Fashion Shopping in Both Present and Future, Provisional application 60/187,397.

The disclosures of the following U.S. patents and patent applications by the inventor, or the inventor and his colleagues, are incorporated herein by reference:

1. "Man machine Interfaces", U.S. application Ser. No. 09/435,854 and U.S. Pat. No. 5,982,352, and U.S. application Ser. No. 08/290,516, filed Aug. 15, 1994, now U.S. Pat. No. 6,008,000, the disclosure of both of which is contained in that of 09/435,854;
2. "Useful Man Machine Interfaces and Applications", U.S. application Ser. No. 09/138,339, now Pub. Appln. 2002-0036617;
3. "More Useful Man Machine Interfaces and Applications", U.S. application Ser. No. 09/433,297;
4. "Methods and Apparatus for Man Machine Interfaces and Related Activity", U.S. Appln. Ser. No. 60/133,673 filed as regular application Ser. No. 09/568,554, now U.S. Pat. No. 6,545,670;
5. "Tactile Touch Screens for Automobile Dashboards, Interiors and Other Applications", U.S. provisional Appln. Ser. No. 60/183,807, filed Feb. 22, 2000, now filed as reg. application Ser. No. 09/789,538; and
6. "Apparel Manufacture and Distance Fashion Shopping in Both Present and Future", U.S. Appln. Ser. No. 60/187,397, filed Mar. 7, 2000.

FIELD OF THE INVENTION

The invention relates to simple input devices for computers, particularly, but not necessarily, intended for use with 3-D graphically intensive activities, and operating by optically sensing a human input to a display screen or other object and/or the sensing of human positions or orientations. The invention herein is a continuation in part of several inventions of mine, listed above.

This continuation application seeks to provide further useful embodiments for improving the sensing of objects. Also disclosed are new applications in a variety of fields such as computing, gaming, medicine, and education. Further disclosed are improved systems for display and control purposes.

The invention uses single or multiple TV cameras whose output is analyzed and used as input to a computer, such as a home PC, to typically provide data concerning the location of parts of, or objects held by, a person or persons.

DESCRIPTION OF RELATED ART

The above mentioned co-pending applications incorporated by reference discuss many prior art references in various pertinent fields, which form a background for this invention. Some more specific U.S. Patent references are for example:

DeMenthon—U.S. Pat. Nos. 5,388,059; 5,297,061; 5,227,985

Cipolla—U.S. Pat. No. 5,581,276

Pugh—U.S. Pat. No. 4,631,676

Pinckney—U.S. Pat. No. 4,219,847

DESCRIPTION OF FIGURES

FIG. **1** illustrates a basic computer terminal embodiment of the invention, similar to that disclosed in copending applications.

FIG. **2** illustrates object tracking embodiments of the invention employing a pixel addressable camera.

FIG. **3** illustrates tracking embodiments of the invention using intensity variation to identify and/or track object target datums.

FIG. **4** illustrates tracking embodiments of the invention using variation in color to identify and/or track object target datums.

FIG. **5** illustrates special camera designs for determining target position in addition to providing normal color images.

FIG. **6** identification and tracking with stereo pairs.

FIG. **7** illustrates use of an indicator or co-target.

FIG. **8** illustrates control of functions with the invention, using a handheld device which itself has functions.

FIG. **9** illustrates pointing at an object represented on a screen using a finger or laser pointer, and then manipulating the represented object using the invention.

FIG. **10** illustrates control of automobile or other functions with the invention, using detected knob, switch or slider positions.

FIG. **11** illustrates a board game embodiment of the invention.

FIG. **12** illustrates a generic game embodiment of the invention.

FIG. **13** illustrates a game embodiment of the invention, such as might be played in a bar.

FIG. **14** illustrates a laser pointer or other spot designator embodiment of the invention.

FIG. **15** illustrates a gesture based flirting game embodiment of the invention.

FIG. **16** illustrates a version of the pixel addressing camera technique wherein two lines on either side of a 1000 element square array are designated as perimeter fence lines to initiate tracking or other action.